

Analyzing School-Based Trip Patterns in Rajshahi City: A Comprehensive Transportation Study

URP 4128: Transportation Planning Studio

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Introduction

2

- A significant proportion of children travel to school on a daily basis
- Depending on **the time, cost, convenience, availability, preference, infrastructure quality, built environment, geographical location**, people use a variety of modes to get to work, school, home resulting in various trip patterns [6]
- Understanding the school-based trip pattern is crucial for **transportation planners and policy-makers.**



What is Trip Pattern?

- A key concept in transportation planning
- Trip patterns describe **how people move** between **locations** as well as the **typical behaviours and habits** associated with their **travel choices**.
- It involves the study or analysis of travel behaviour, including the frequency, purpose, mode of transportation, distance, and timing of trips taken by individuals or populations
- **It is the regular or repeated sequence of trips made by an individual or group of people.**
- Used to predict the transportation demand, and identify areas where improvements are needed.

What is Travel Behaviour?

- Travel Behavior refers to the study of how **individuals make choices and decisions** related to **their travel activities**, including **transportation mode selection, destinations, timing, and decision-making rules**.
- Travel behavior patterns include **commuting, leisure/recreation, errands/shopping, social/family visits, and attending special events**.
- A study by Beck et al. (2023) implies that **travel behaviour remains consistent and unaffected by the destination for both parents and adolescents**. [5]

Objectives:

- **To assess the school-based trip pattern characteristics in Rajshahi City**
- **To assess the adequacy and efficiency of transportation infrastructure with a focus on areas surrounding schools in Rajshahi City**

Coordination Schema:

6

Objectives	Complex Variables	Simple Variables	Data Types	Data Sources
To assess the school-based trip pattern characteristics in Rajshahi City	• School-based trip patterns	• Modes of transportation • Trip length • Travel times • Trip frequencies	• Quantitative	• Pilot survey • Questionnaire survey
To assess the adequacy and efficiency of transportation infrastructure with a focus on areas surrounding schools in Rajshahi City	• Transportation infrastructure	• Road networks • Sidewalks • Public transit options	• Qualitative	• Field survey • Government reports

Scopes of the study

7

- **No study has been done** in the past regarding student travel patterns and behaviour in Rajshahi City.
- **Assess the existing transportation infrastructure** surrounding Cantonment School and Paramount School, including road conditions, sidewalks, and public transportation accessibility.
- **Examine the factors influencing mode choice** for school trips
- **Identify potential barriers and challenges** in implementing recommendations for improving school-based transportation etc.

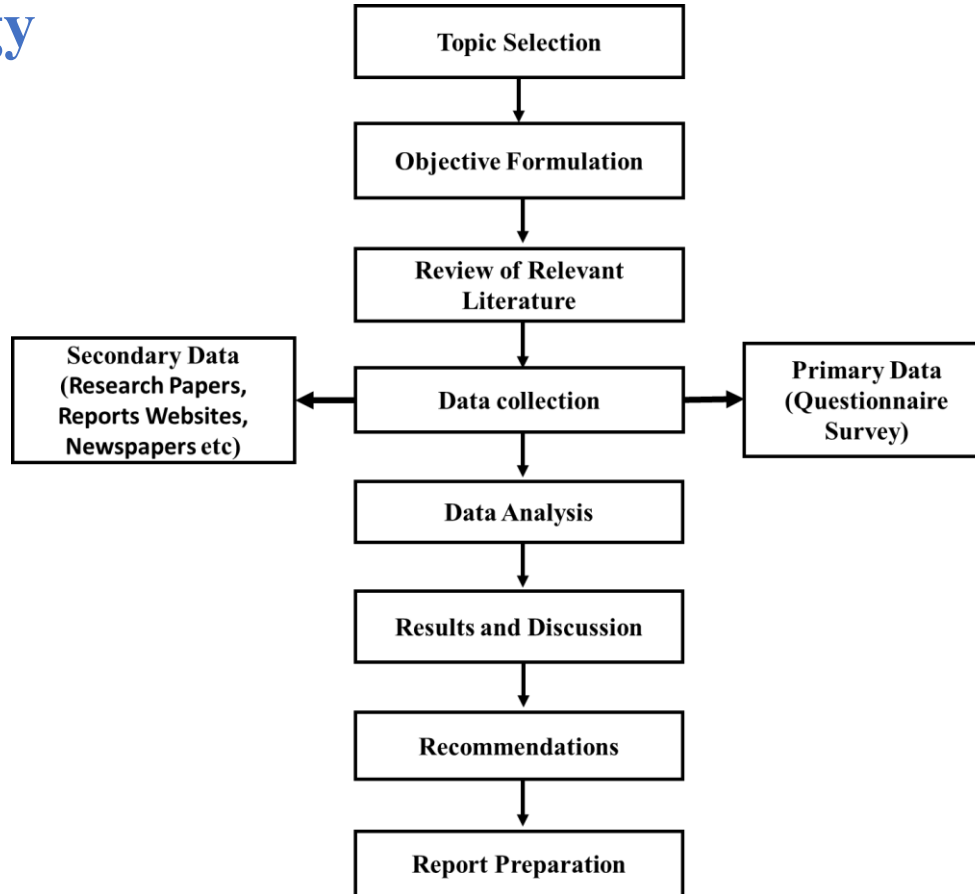
Limitations of the study

8

- The study **focuses on only two schools** in Rajshahi City, which may not represent the entire school population and transportation patterns of the city.
- The study's findings may be limited by **the number of participants involved in surveys and questionnaires**, as it may not capture the diverse perspectives and experiences of all students, parents
- The data collected through surveys and questionnaires relies on **participants' self-reported information**, which may be subject to **recall bias or social desirability bias**.
- The study may not fully account for **external factors** that can influence school-based trip patterns, such as **weather conditions, special events, or road constructions**, which can impact the accuracy of the findings
- The study's **timeframe may be limited**, which could restrict the depth and breadth of data collection and analysis, potentially impacting the comprehensiveness of the findings.

Methodology

9



Study Area

10



- **Rajshahi Cantonment Public School and College**
 - Students of Primary and Secondary Level: 1377
 - Bangla Medium

- **Paramount School and College**
 - Students of Primary and Secondary Level: 300
 - English Medium



Reason for choosing these 2 schools:

- Covers both **Bangla and English Medium** students
- Covers both **Male and Female** students
- Covers both **Primary and Secondary** Level students

Data Sampling

11

Technique: Random Sampling

- Data Collection from two schools
- Surveying the students/guardians who are available at the time of the survey.

Total Sample Size: 121

Rajshahi Cantonment Public School and College

Population Size: 1377

Confidence Level: 90%

Margin of Error: 10%

Sample Size: 65

Paramount School and College

Population Size: 300

Confidence Level: 90%

Margin of Error: 10%

Sample Size: 56

Data Analysis

For

Objective 1:

To assess the school-based trip pattern characteristics in Rajshahi City

Data Analysis

13

(Rajshahi Cantonment Public School and College)

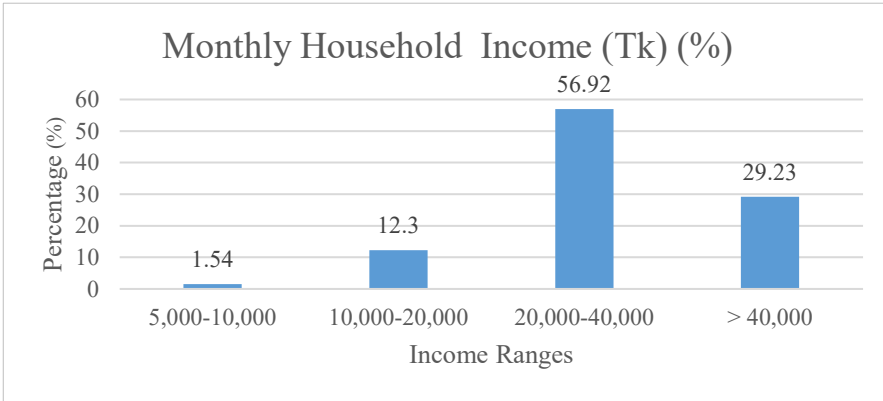


Fig: Monthly Household Income (Tk) (%)

Source: (Authors' Preparation, 2023)

- The **highest percentage of respondents (56.92%)** fall into the income category of **20,000-40,000 Tk.**
- A **significant proportion of respondents (29.23%)** have a monthly household income **above 40,000 Tk.**

(Paramount School and College)

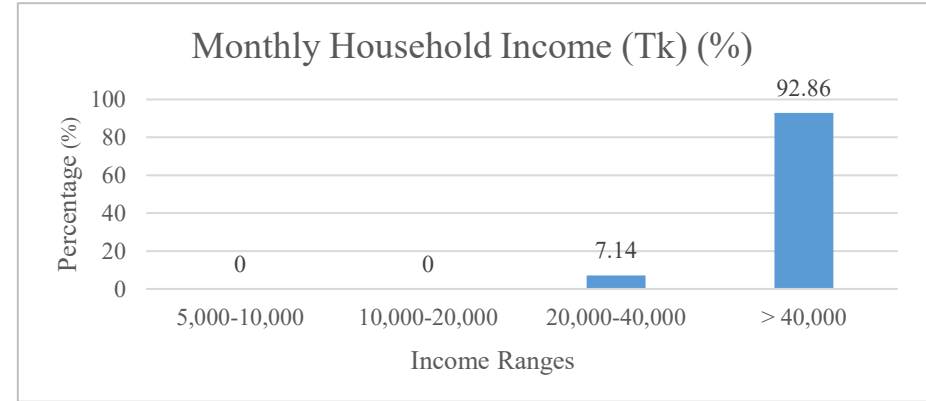


Fig: Monthly Household Income (Tk) (%)

Source: (Authors' Preparation, 2023)

- The **majority of respondents (92.86%)** have a monthly household income **above 40,000 Tk.**
- The income category of **20,000-40,000 Tk** comprises **7.14% of the respondents.**

Data Analysis

14

(Rajshahi Cantonment Public School and College)

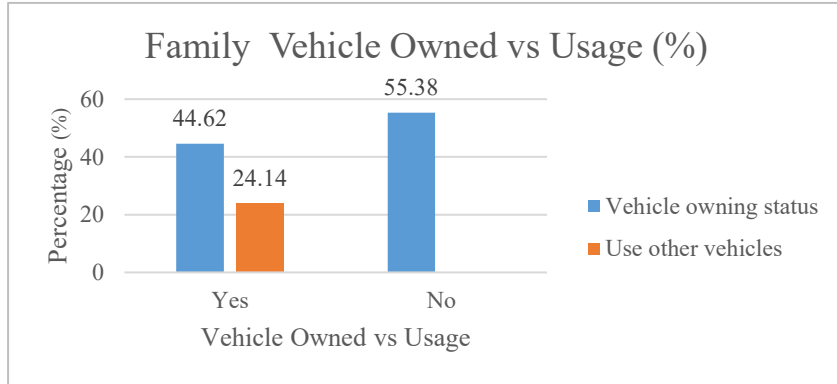


Fig: Family Vehicle Owned vs Usage (%)

Source: (Authors' Preparation, 2023)

- 44.62% students' family own personal vehicle
- 55.38% students' family don't own any vehicle
- **24.14%** students use **other mode of transport** instead of using family vehicle.

(Paramount School and College)

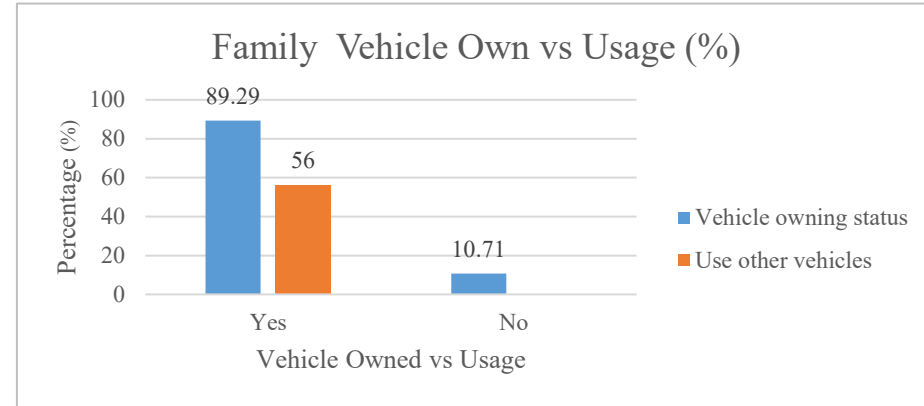


Fig: Family Vehicle Owned vs Usage (%)

Source: (Authors' Preparation, 2023)

- 89.29% students' family own personal vehicle
- 10.71% students' family don't own any vehicle
- **56%** students use **other mode of transport** instead of using family vehicle.

Data Analysis

(Rajshahi Cantonment Public School and College)

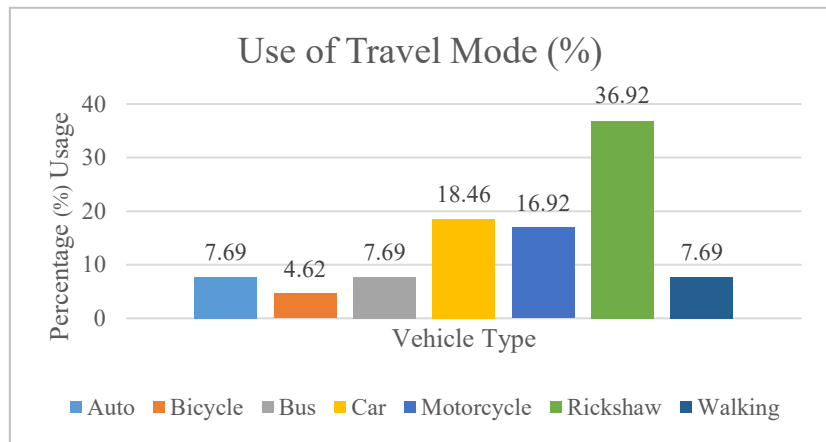


Fig: Use of Travel Mode (%)

Source: (Authors' Preparation, 2023)

- **Rickshaws** are the **most favored** mode of travel among respondents, with a significant percentage of **36.92%**
- **Cars and motorcycles** follow closely behind, with **18.46%** and **16.92%** respectively
- The usage of **autos, buses, bicycles, and walking is relatively lower**, each accounting for **7.69% or less** of the respondents

(Paramount School and College)

15

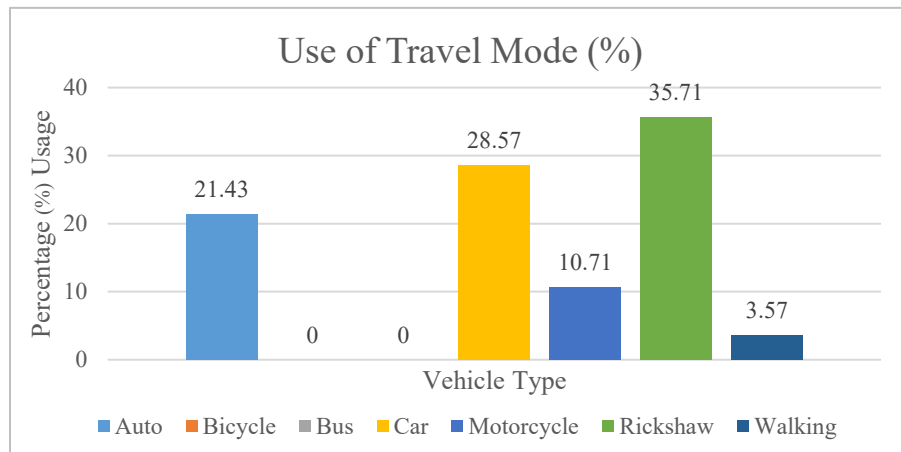


Fig: Use of Travel Mode (%)

Source: (Authors' Preparation, 2023)

- **Rickshaws** are the top choice (**35.71%**)
- Followed by **cars and auto**, **28.57%** and **21.43%** respectively
- The school don't provide any bus or transport facilities.

Data Analysis

(Rajshahi Cantonment Public School and College)

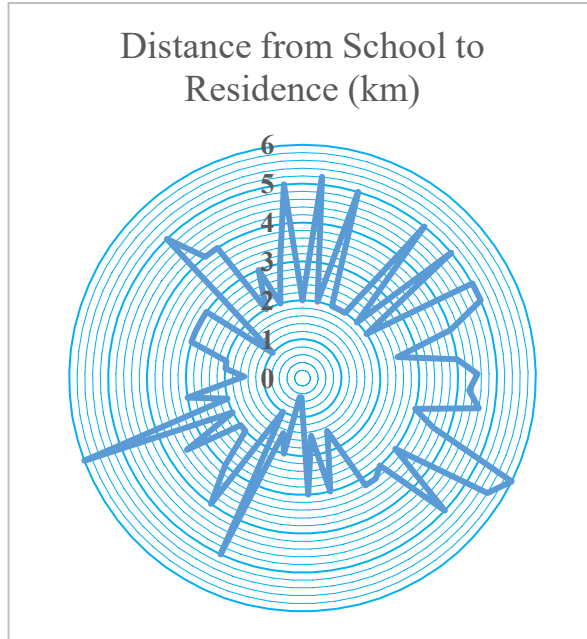


Fig: Distance from School to Residence (km)

Source: (Authors' Preparation, 2023)

➤ Max Range **6 Km** from School

Residence Locations

- Kadirganj
- Court Station
- Terokhadia
- Padma Residential Area
- Upashahar
- Nowdapara
- Sopura
- Lokkhipur
- Horogram Bazar
- Vodra
- Bornali
- Shalbagan
- New Market
- Choto Bongram
- C&B
- Sagarpara
- Veripara
- Bahrampur
- Sadurmor

16

(Paramount School and College)

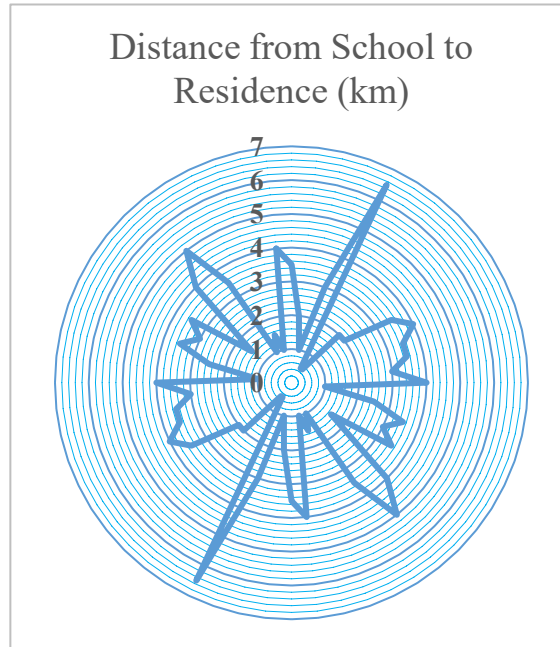


Fig: Distance from School to Residence (km)

Source: (Authors' Preparation, 2023)

➤ Max Range **6.5 Km** from School

Residence Locations

- Court Station
- Padma Residential Area
- Upashahar
- Sopura
- Lokkhipur
- Vodra
- Bornali
- Shalbagan
- Bongram
- Choto Bongram
- Hadir Mor
- Boalia
- Ammchattar

Data Analysis

(Rajshahi Cantonment Public School and College)

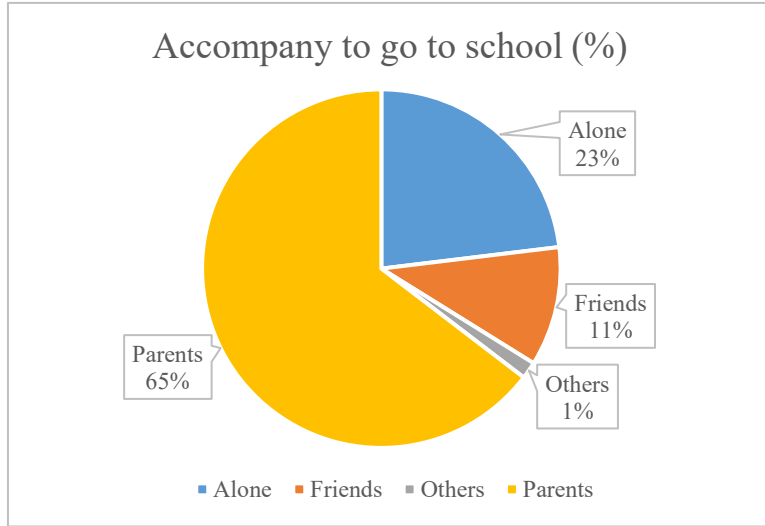


Fig: Accompany to go to school (%) Source: (Authors' Preparation, 2023)

- The **majority** of respondents (**64.62%**) go to school with their **parents**
- Some students prefer going **alone** (**23.08%**)
- Smaller percentage accompany their **friends** (**10.77%**) or **others** (**1.54%**)

17

(Paramount School and College)

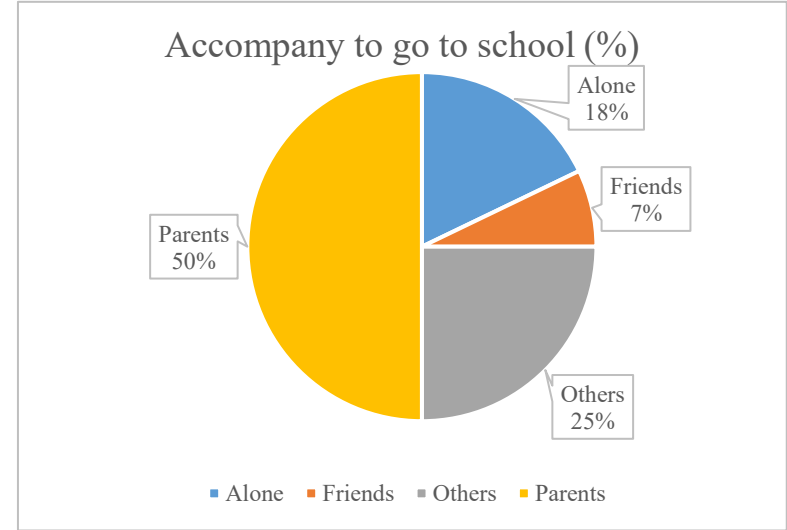
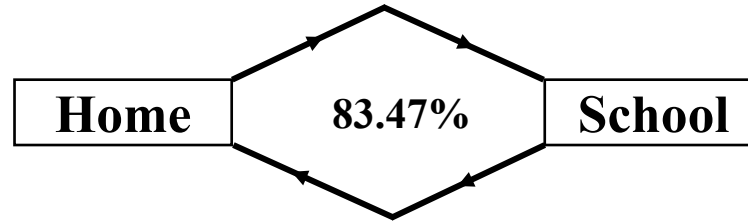


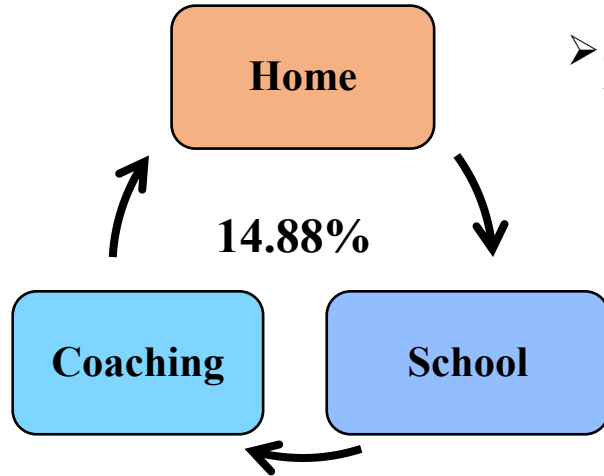
Fig: Accompany to go to school (%) Source: (Authors' Preparation, 2023)

- The **majority** (**50%**) of students go to school with their **parents**
- A significant portion (**17.86%**) prefer to go **alone**
- Some students (**25%**) are **accompanied by others**
- Only a small **minority** (**7.14%**) travel with **friends**

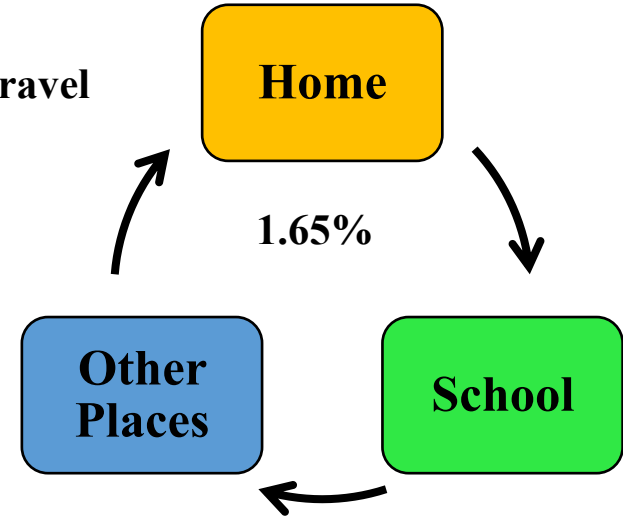
Trip Types



➤ 83.47% of the respondents travel between home and school



➤ 14.88% of the respondents go to coaching after school and return home afterwards



➤ 1.65% of the respondents go to other places after school and return home afterwards

Trip Types: Home Based

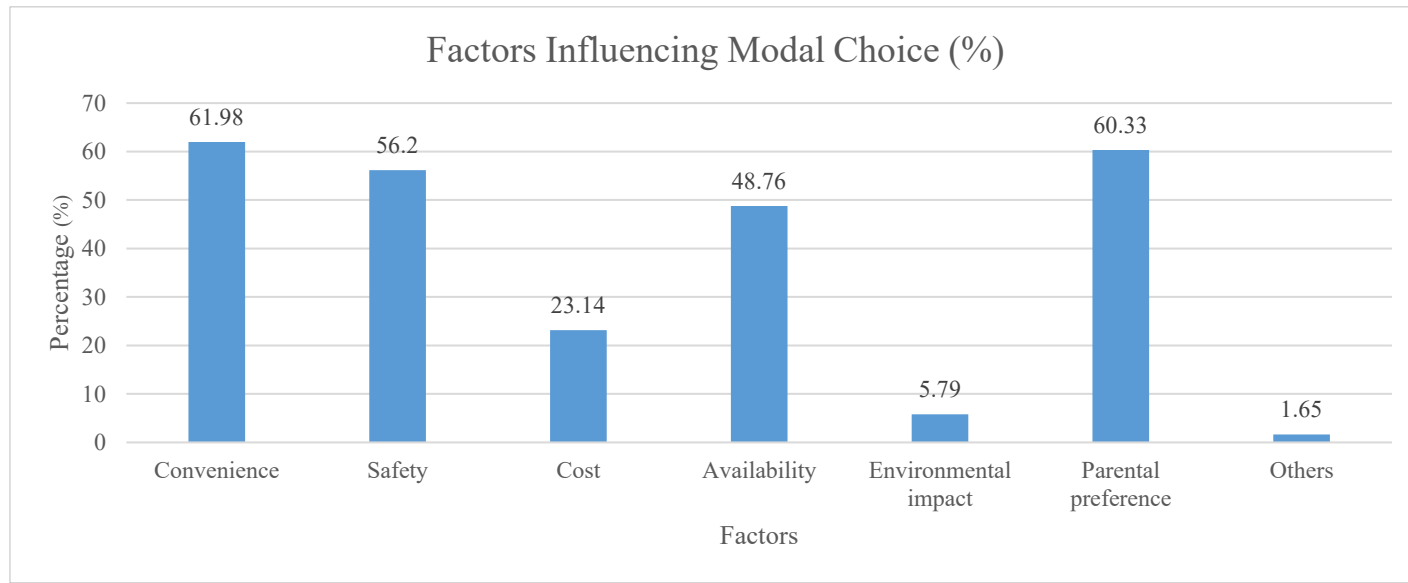


Fig: Factors Influencing Modal Choice (%)

Source: (Authors' Preparation, 2023)

- Most of the students/their parents chose **“Convenience, Safety, Availability, Parental Preference”** as factor for choosing their travel mode
- **Only 23%** identifies **“Cost”** as a factor for modal choice, whereas **5%** respondent were conscious about **“Environmental impact”** while choosing travel mode
- **1.65%** Students chose **“Time Table”** and **“Travel with Friends”** as factor for choosing their travel mode

Data Analysis

20

- The **Travel Cost** and the **Travel Time** depends on the **mode choice**, and **distance** from **home to school**
- **Respondents** choice “**Availability**” factor while they **travel** with their **own vehicle** or travel by rickshaw, as rickshaw is available everywhere in Rajshahi City
- Respondents go for “**Safety**” factor while they **travel with their own vehicle**
- While respondents choice “**Parental Preference**” factor, **most of the time** they travel with their **parents**

Data Analysis

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Objective 2:

To assess the adequacy and efficiency of transportation infrastructure with a focus on areas surrounding schools in Rajshahi City

Data Analysis

22

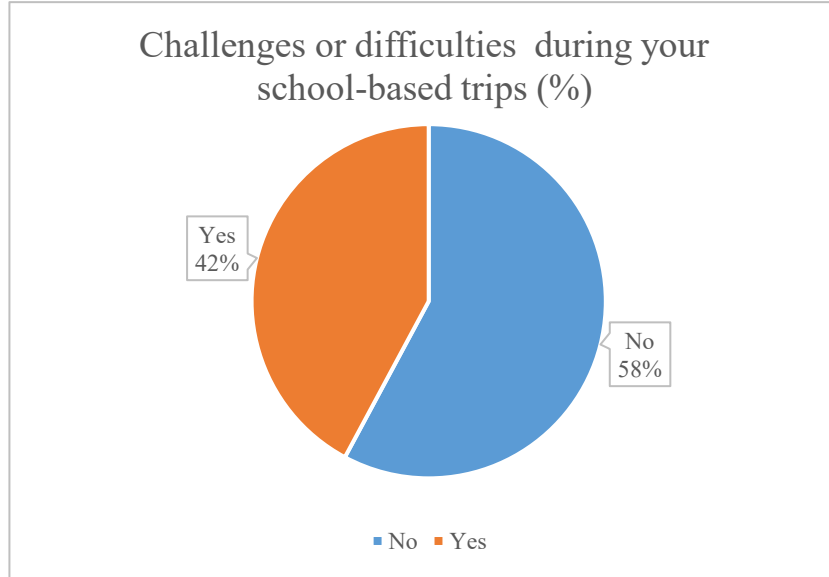


Fig: Challenges or difficulties during your school-based trips (%)

Source: (Authors' Preparation, 2023)

Challenges or Difficulties

- Traffic Jam in Pick Hour
- Road to School is very narrow
- Improper crowd management
- Noise pollution
- Rickshaw always not available
- Unexpected rain/weather conditions etc.

- A significant portion of students (**42.15%**) faced **challenges or difficulties** during their **school-based trips**
- The majority (**57.85%**) **did not encounter** any significant **issues**

Data Analysis

23

(Rajshahi Cantonment Public School and College)

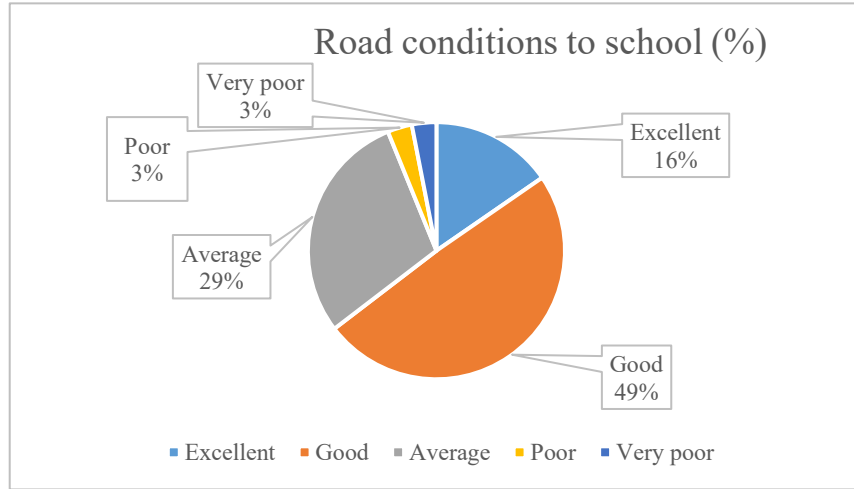


Fig: Road conditions to school (%)

Source: (Authors' Preparation, 2023)

- The **majority** of respondents (**49.23%**) reported that the road conditions to school are **"Good"**
- Approximately **29.23%** of respondents are **"Average"** and with **15.38%** of respondents perceived the road conditions as **"Excellent"**
- Only a **small percentage** of respondents, **3.08%** each, rated the road conditions as **"Poor"** or **"Very Poor"**

(Paramount School and College)

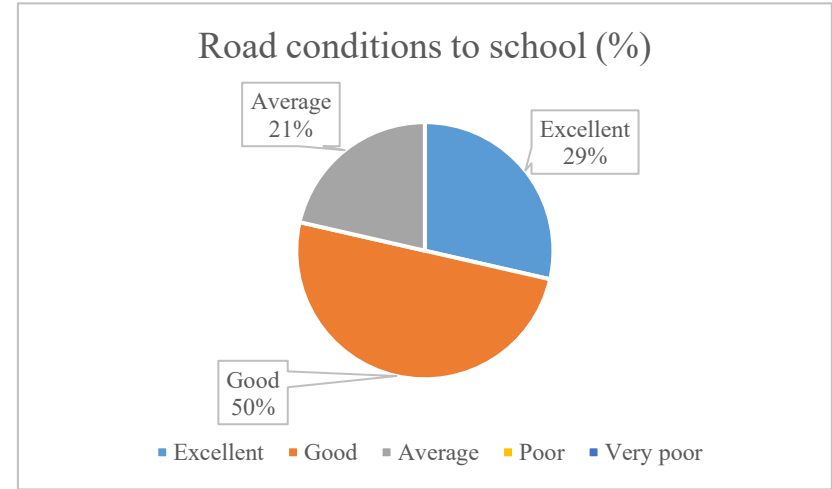


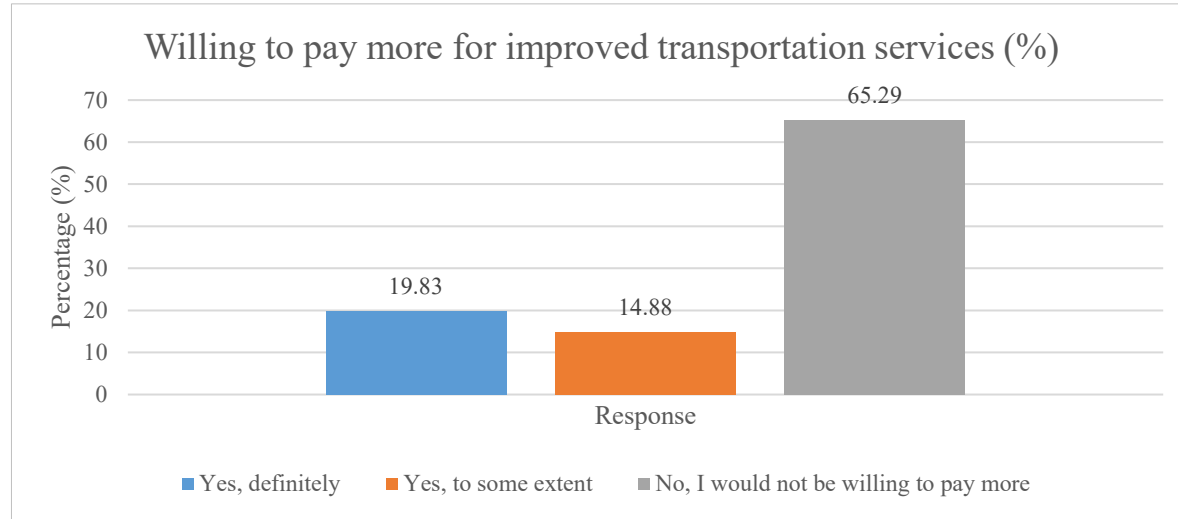
Fig: Road conditions to school (%)

Source: (Authors' Preparation, 2023)

- The **half** of the respondents (**50%**) marked that the road conditions to school are **"Good"**
- Approximately **21%** of respondents are **"Average"** and with **29%** of respondents perceived the road conditions as **"Excellent"**

Data Analysis

24



Source: (Authors' Preparation, 2023)

Fig: Willing to pay more for improved transportation services (%)

- **19.83%** stating they would definitely **willing to pay more for improved transportation services**
- An additional **14.88%** being **willing to pay more to some extent**
- However, the **majority (65.29%)** are **not willing to pay more** for improved transportation services

Data Analysis

25

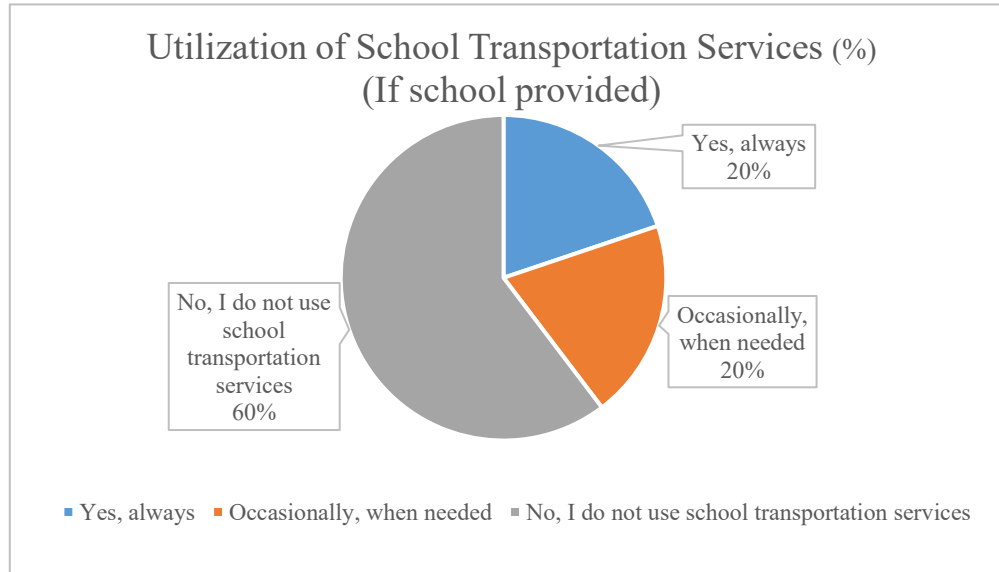


Fig: Utilization of School Transportation Services (%) (If school provided)

Source: (Authors' Preparation, 2023)

Reason for not using school transportation services

- Convenience
- Residence is near to school
- Owns car
- Travels with parents
- Parental preference
- Time table mismatch with school bus
- Not provide school bus till class 3
- Fare of School bus is pricey than other vehicle
- School bus route not available near home
- No risk of missing the school bus etc.

- Nearly **(20%) respondents** ensured always utilize school transportation services.
- Another **20% of respondents** use school transportation services occasionally, only when needed.
- The **majority (60%)** of respondents do not use school transportation services at all.

Data Analysis

26

(Rajshahi Cantonment Public School and College)

- Students generally go school **mostly 5-6 days in a week**
- **Proper footpath is present** on both sides of the road to school
- There is **no proper designated pickup zones**
- Experiences **congestion during peak hour**
- This school **provides transportation facilities**
- School Bus Service Fees is about **1200 Tk** per month.
- **Bicycle parking** facilities in this school is **available**

(Paramount School and College)

- Students generally go school **mostly 5-6 days in a week**
- **Proper footpath is absent** near the road to school
- There is **no proper designated pickup zones**
- Experiences **minor congestion during peak hour**
- This school **doesn't provide transportation facilities now**, they provided the facilities before Covid-19 Pandemic
- **Bicycle parking** facilities in this school is **not available**

Conclusion

27

- Both schools show a **significant portion** of respondents with a monthly **household income percentage** falling into the **20,000-40,000 Tk** or **more than 40,000 Tk** category
- **Rickshaws** are the most **popular travel mode** for **both schools**, followed by **cars** and **motorcycle**
- A **substantial number of respondents** have access to **personal vehicles**, impacting their **choice of transportation to school**
- Encourage **cycling** for **secondary school students**
- Encourage more students to **use school transportation services** through awareness campaigns emphasizing **safety, convenience** and **environmental impacts**
- **Collaborate** with local authorities to **address traffic jam issues** during **peak hours**
- Provide **designated pick-up** and **drop-off zones** for students

Thank You



References

- [1] McGuckin, N., & Murakami, E. (1999). Examining trip-chaining behavior: Comparison of travel by men and women. *Transportation Research Record*, 1693, 79–85. <https://doi.org/10.3141/1693-12>
- [2] Mode choice. (2023). Travel Forecasting Resource. Retrieved from tfresource.org website: https://tfresource.org/topics/Mode_choice.html
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- [4] Jean-Paul Rodrigue. (2020). Geography of Transport Systems. (5th ed., pp. 151–207). S.L.: Routledge. Retrieved from <https://transportgeography.org/>
- [5] Beck, F., Marzi, I., Renninger, D., Demetriou, Y., Engels, E. S., Niermann, C., & Reimers, A. K. (2023). Associations of parents' and adolescents' active travel behavior across various destinations – a sex/gender analysis. *BMC Public Health*, 23(1), 522. <https://doi.org/10.1186/s1288902315428x>
- [6] Mwale, M., Luke, R., & Pisa, N. (2022). Factors that affect travel behaviour in developing cities: A methodological review. *Transportation Research Interdisciplinary Perspectives*, 16, 100683. <https://doi.org/10.1016/j.trip.2022.100683>